this purpose will be seen from the table. The drying time is cut by a factor of 7 and the time required to achieve mechanical strength is cut by a factor of 12.
A vibration machine illustrated in Fig.2 was used to apply fittings to high-voltage insulators and greatly increased the mechanical strength. The benefit that resulted from the introduction of conveyors is also described.
There are 2 figures.

ASSOCIATION: Orgenergostroy (Moscow Branch) (Moskovskiy filial)
SUBMITTED: January 10, 1957
AVAILABLE: Library of Congress
Card 2/2

BOCHINSKIY, M.P., inzh.; GAYDASH, B.I., inzh.; GLUSHENKO, V.N., inzh.; IVAKHIN, S.I., inzh.

Concerning the design of bar insulators for the contact networks of electrified railroads. Vest. elektroprom. 31 no.8:12-14 Ag '60. (MIRA 15:5)
(Electric railroads--Wires and wiring)
(Electric insulators and insulation)

GAYDASH, B.I., inzh.; IVAKHIN, S.I., inzh.; GLUSHCHENKO, V.N., inzh.

Advantages of helical insulators. Energ. i elektrotekh. prom. no.2: 53-54 Ap-Je '64. (MIRA 17:10)

IVAKHIN, S.I., kand.tekhn.nauk; GAYDASH, B.I., inzh.; MIRONOV, I.M., inzh.; SITNIK, N.P., inzh.

Use of synthetic materials in high-voltage insulators. Energ. i elektrotekh. prom. no.2:37-38 Ap-Je '65. (MIRA 18:8)

IVAKHIN, S.I., kand. tekhn. nauk; GRUSHCHENKO, V.N., inzh.; KOTELEVTSEV, V.G., inzh.; DEREVYAGIN, G.F., inzh.

Support insulators for special systems. Energ. i elektrotekh. prom. no.3:43-44 Jl-S '65. (MIRA 18:9)

L 1139-66 (A)

ACCESSION NR: AP5020392

UR/0105/65/000/008/0089/0091
621.315.62.001.4

AUTHOR: Gaydash, B. I., Engineer (Slavyansk); Ivakhin, S. I., Candidate of technical sciences (Slavyansk); Glushchenko, V. N., Engineer (Slavyansk); Kotlik, V. I., Engineer (Slavyansk)

TITLE: Investigation of helically ribbed insulators

SOURCE: Elektrichestvo, no. 8, 1965, 89-91

TOPIC TAGS: electric insulator, electric distribution equipment

ABSTRACT: The discharge characteristics of helically ribbed insulators are studied as a function of rib profile and number of threads for single, double and triple threaded insulators. These characteristics are compared with those of conventionally ribbed insulators of identical types. Three types of rib profile are compared (see fig. 1 of the Enclosure). The wet and dry discharge voltages of the insulators were measured at power frequencies. The results are tabulated for vertical and horizontal positions. It was found that the dry discharge voltage for all types of insulators is independent of the rib profile and the number of threads, and is com-

Card 1/3

L 1139-66

ACCESSION NR: AP5020392

parable to the dry discharge voltage of identical conventional insulators with annular ribs. Curves are given for the wet discharge voltages as a function of the number of threads for the three types of profile shown in fig. 1 of the Enclosure. Helically ribbed insulators showed higher wet discharge voltages in all cases than those of the conventional insulators. Insulators with single threaded helical ribs and the profile shown in fig. 1c of the Enclosure have the maximum wet discharge characteristics, exceeding those of identical conventional insulators by 25-40%. Triple threaded helically ribbed insulators with the profile shown in fig. 1 a of the Enclosure have the minimum wet discharge characteristics, surpassing those of similar conventional types by 2-10%. The current leakage path is longer for helically ribbed insulators both along the spiral and along the axis. The optimum pitch for these insulators is 50-70 mm. The optimum ratio between radial overhang and pitch is 0.8-1.0. The thickness of the rib should be kept to a minimum consistent with technological requirements. These data must be verified by operational tests under various climatic conditions. Orig. art. has: 6 figures, 1 table.

ASSOCIATION: none

SUBMITTED: 23Nov64 ENCL: 01 SUB CODE: EE

NO REF SOV: 005 OTHER: 000

Card 2/3

L 1139-66

ACCESSION NR: AP5020392

ENCLOSURE: 01

Fig. 1. Rib profiles.

Card 3/3

MATVEYEV, M.A., doktor tekhn.nauk; IVAKHIN, S.I., kand.tekhn.nauk; KONSTANTINOV, E.G., inzh.; GAYDASH, B.I., inzh.

Use of pegmatites of the Aleksandrovsk and Krasnovsk deposits in the production of high voltage insulators. Stek. i ker. 22 no.1:30-33 Ja '65. (MIRA 18:7)

1. Moskovskiy ordena Lenina khimikotekhnologicheskiy institut im. D.I.Mendeleyeva (for Matveyev). 2. TSentral'naya nauchno-issledovatel'skaya laboratoriya tresta Armset' (for Gaydash).

IVAKHIN, S.I., kand. tekhn. nauk

Orthophyres as feldspar raw material for high voltage electric porcelain. Stek. i ker. 22 no.9:7-8 S '65. (MIRA 18:9)

1. TSentral'naya nauchno-issledovatel'skaya laboratoriya tresta Elektroset'izolyatsiya.

ACC. NR. BC5003919 S/0072/64/000/003/0023/5526

REEL NR. 839 44

New coatings for improving insulator glazes. L. A. Ivakhina, R. I. Gress, and S. I. Ivakhin. Steklo i Keram. 21(3), 23-6 (1964). Two epoxy resin compns., one brown and one white, were studied for elec. insulators. Et_3N was used as a hardener in both compns. A resinate of Mn was employed as a drying accelerator for the brown coating and H_3PO_4 for the white. The compns. are: (white) resin ED-6(10, Et_3N 1, rosin 0.5, ZnO 5, porcelain powder 1.5. solvent gacetone and anhyd. H_3PO_4 in ratio 9:1 by vol.) 5 parts by wt., (brown) resin ED-6-10, Et_3N 1, ocher 6.1, iron oxide 0.4, pyrolusite or MnO_2 0.5, solvent (2% soln. of Mn resinate in acetone) 5 parts by wt. The tensile strengths of the white and brown coated insulators are 500 and 515 kg./cm.^{2}, resp. The elec, strengths are 29.6 and 32kv./mm., resp., (at 50 cycles/sec.). The adjesions of the coatings are 150 and 170 kg./cm.^{2}.resp., after cold hardening and >300 kg./cm.^{2} for both after hot hardening. The H_2O absorptions are 0.05 and 0.03%, resp., after 24 hrs. and 0.14 and 0.09% after 1 week. The H_2O stabilities at 20° are good for both coatings and at 100° disintegration occurs after 48 and 52 hrs., resp. The stability in oil is satisfactory for the white and good for the brown. The thermal stability is 126° for the white and 180° for the brown coating. An unglazed sample has a tensile strength of 300 kg./cm.^{2} and an elec. strength of 25.6 kv./mm. The H_2O absorption of the unglazed sample is 0.03 and 0.035% after 24 hrs. and 1 week, resp. John H. Fishwick

Card 1/1

IVAKHIN, S.I., kand. tekhn. nauk; IVAKHINA, L.A., inzh.; LESHCHENKO, N.P., inzh.; GRESS, R.I., inzh.

Increasing the efficiency of the coarse grinding of feldspar raw materials. Stek. i ker. 22 no.12:19-22 D '65.

(MIRA 18:12)

1. Slavyanskiy keramiko-izolyatornyy kombinat.

L 22143-66 EWP(e)/EWT(m) WH

ACC NR: AP6012955 SOURCE CODE: UR/0072/65/000/009/0007/0008

AUTHOR: Ivakhin, S. I. (Candidate of technical sciences)

ORG: Central Scientific Research Laboratory, Electric Network Insulating Trust

TITLE: Orthophyres used as feldspar raw materials for high-voltage electric porcelain

SOURCE: Steklo i keramika, no. 9, 1965, 7-8

TOPIC TAGS: mineral, aluminum silicate mineral, porcelain, electric insulator

ABSTRACT: The article describes the orthophyres recently discovered in the Donets Oblast. The unvarying mineralogical composition with prevalence of common potash feldspar, extremely insignificant iron oxides content and favorable alkali ratio make these orthophyres a promising material for use in high-voltage electric porcelain compositions. Three batches of experimental compositions were prepared for testing. The percentage content of the orthophyre was varied. Reference specimens and type PM-4.5 suspension line insulators were also made from these experimental compositions. The insulators and reference specimens were then baked in a tunnel annealing furnace and then tested. The quality was verified by aniline red-alcohol pressure impregnation petrographic and dilatometric methods. The electromechanical breaking load and breakdown voltage in oil exceed the norm-specified

Card 1/2 UDC: 666.36.4

L 22143-66

ACC NR: AP6012955

requirements for all three compositions. The fittings failed under load but the insulator's porcelain components remained intact. Evidently, orthophyres will in the future find wide application in the insulator industry as a new type of feldspar raw material. Orig. art. has: 4 tables. [JPRS]

SUB CODE: 11, 08, 09 / SUBM DATE: none

Card 2/2 BK

ACC. NR. BC5003919 S/0072/64/000/003/0023/5526

REEL NR. 838 44

New coatings for improving insulator glazes. L. A. Ivakhina, R. I. Gress, and S. I. Ivakhin. Steklo i Keram. 21(3), 23-6 (1964). Two epoxy resin compns., one brown and one white, were studied for elec. insulators. Et_3N was used as a hardener in both compns. A resinate of Mn was employed as a drying accelerator for the brown coating and H_3PO_4 for the white. The compns. are: (white) resin ED-6-10, Et_3N 1, rosin 0.5, ZnO 5, porcelain powder 1.5, solvent gacetone and anhyd. H_3PO_4 in ratio 9:1 by vol.) 5 parts by wt., (brown) resin ED-6-10, Et_3N 1, ocher 6.1, iron oxide 0.4, pyrolusite or MnO_2 0.5, solvent (2% soln. of Mn resinate in acetone) 5 parts by wt. The tensile strengths of the white and brown coated insulators are 500 and 515 kg./cm.^{2}, resp. The elec. strengths are 29.6 and 32kv./mm., resp., (at 50 cycles/sec.). The adjesions of the coatings are 150 and 170 kg./cm.^{2} resp., after cold hardening and >300 kg./cm.^{2} for both after hot hardening. The H_2O absorptions are 0.05 and 0.03%, resp., after 24 hrs. and 0.14 and 0.09% after 1 week. The H_2O stabilities at 20° are good for both coatings and at 100° disintegration occurs after 48 and 52 hrs., resp. The stability in oil is satisfactory for the white and good for the brown. The thermal stability is 126° for the white and 180° for the brown coating. An unglazed sample has a tensile strength of 300 kg./cm.^{2} and an elec. strength of 25.6 kv./mm. The H_2O absorption of the unglazed sample is 0.03 and 0.035% after 24 hrs. and 1 week, resp. John H. Fishwick

Card 1/1

IVAKHIN, S.I., kand. tekhn. nauk; IVAKHINA, L.A., inzh.; LESHCHENKO, N.P., inzh.; GRESS, R.I., inzh.

Increasing the efficiency of the coarse grinding of feldspar raw materials. Stek. i ker. 22 no.12:19-22 D '65. (MIRA 18:12)

1. Slavyanskiy keramiko-izolyatornyy kombinat.

IVAKHNENKO, A. G.

Ivakhnenko, A. G. - "Analytical selection of a law for control of systems having a constant speed servomotor under aperiodic conditions of forced motion," Sbornik nauch.-tekhn. statey (Akad. nauk Ukr. SSR, In-t elektrotekhniki), Issue 2, 1948, p. 47-59, - Bibliog: 5 items

SO: U-4355, 14 August 53, (Letopis 'Zhurnal 'nykh Statey, No. 15, 1949)

IVAKHNENKO, A. G.

Ivakhnenko, A. G. - "The selection of non-linear couplings and the synthesis of automatic regulator hook-ups by feedback method," Sbornik nauch.-tekhn. statey (Akad. nauk Ukr. SSR, In-t elektrotekhniki), Issue 2, 1948, p. 60-77, - Bibliog: 9 items

SO: U-4355, 14 August 53, (Letopis 'Zhurnal 'nykh Statey, No. 15, 1949)

IVAKHNENKO, A.G., kandidat tekhnicheskikh nauk.

Investigation of a nonlinear synchronous servo system including calculation of power amplifier inertia. Sbor.trud.Inst.energ.AN URSR no.3:24-34 '48. (MLRA 9:1)

(Servomechanisms)

IVAKHNENKO, A. G.

Stability

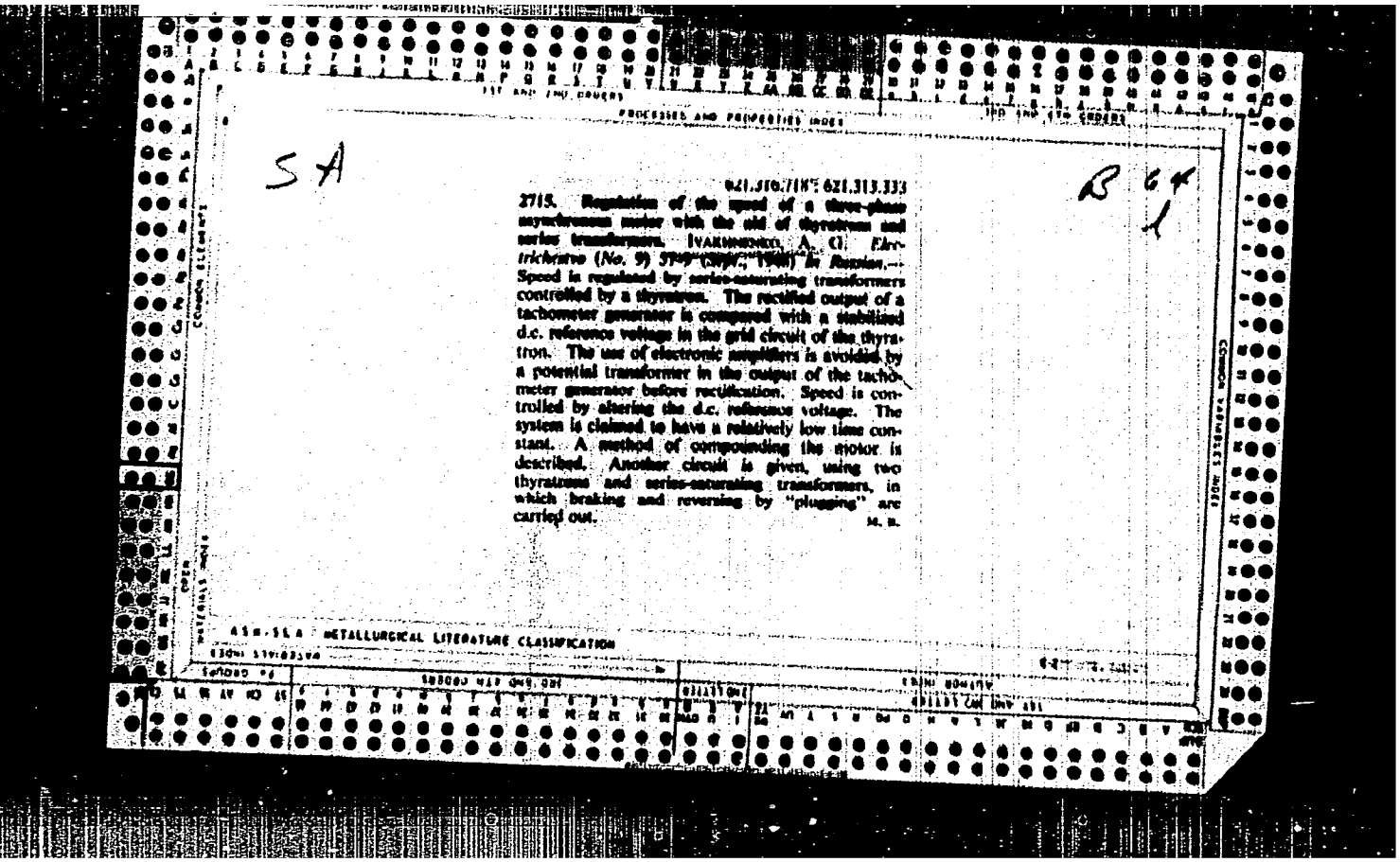
Determination of the range of stability in closed dynamic systems. Zbir. prats' Inst. bud. mekh. No. 8, 1948

Ak Nauk URSR, Kiev

Inst. budivel'noyi mekhaniky.

Zbirnyk prats'.

Monthly List of Russian Accessions, Library of Congress, November 1952 UNCLASSIFIED



621.316.718: 621.313.333

2715. **Regulation of the speed of a three-phase asynchronous motor with the aid of thyratrons and series transformers.** IVANOVSKII, A. G. *Elektrichestvo* (*No.* 9) 57-59 (Sept., 1948) *In Russian.*—Speed is regulated by series-saturating transformers controlled by a thyratron. The rectified output of a tachometer generator is compared with a stabilized d.c. reference voltage in the grid circuit of the thyratron. The use of electronic amplifiers is avoided by a potential transformer in the output of the tachometer generator before rectification. Speed is controlled by altering the d.c. reference voltage. The system is claimed to have a relatively low time constant. A method of compounding the motor is described. Another circuit is given, using two thyratrons and series-saturating transformers, in which braking and reversing by "plugging" are carried out. M. B.

IVAKHENKO, A.G.

37328. Ivakhnenko, A. G., Parra, I. K,. i Fevraleva, N. E. Raschet [illegible]ystrodeystvuyushca i k[illegible] sled ashchikh sistem regulrovaniya s vysokoy dobrothost'yu sbornik nauch. - Tekhn. Statey. (Akad. Nauk Ukr. Ssr. in-t elektrotekhnki), Vyp. 3, 1949, s. 81-102. Bibliogr: 16 Nazv

SO: Letopis' Zhurnal'nykh Statey, Vol. 7, 1949

IVAKHNENKO, A. G.

37306. Khrushchova, N. V. i Ivakhnenko, A. G. Metodika rascheta optimal'nykh znacheniy postoyanykh rezonansnogo izmeritel'nogo elementa chastoty. Sbornik nauch. - tekhn. statyey (Akad. nauk Ukr. SSR., In-t elektrotekhniki), VYP. 3 1949, s. 103-13

SO: Letopis' Aburnal'nykh Statey, Vol. 7, 1949

[redacted], A. G.

IVAKHENKO A-G.

M 153T58

USSR/Engineering - Synchronous Machine Nov 49
Instruments, Electronic

"A Trigger Device for Measuring and Registering the Rotor-Shift Angle of Synchronous Machines," A. G. Ivakhenko, Cand Tech Sci, I. K. Parra, Engr, Inst of Elec Eng, Acad Sci Ukrainian SSR, 3 1/2 pp

"Elektrichestvo" No 11

Describes photoelectric device for measuring, transmitting, and recording rotor-shift angle of synchronous machine with respect to rotor of second synchronous machine, or with respect to voltage vector at any point of three-phase circuit. Includes eight diagrams. Submitted 16 Jul 49.

153T58

IVAKHNENKO, A. G.

Automatic Control

Magnetic driving gear with short-circuit asynchronous motor for controlling the speed of the operating mechanisms, Stan. i instr., No. 12, 1951.

9. Monthly List of Russian Accessions, Library of Congress, March 1954. Unclassified.

IVAKHNENKO, A. G.

"Automatic Regulating of the Speed of Short-Circuit, Triple-Phase, Asynchronous Engines," Electricity, Publ. by the Printing House of the Govt. Energy (Electrical) Publ. House, in Moscow, 1952.

IVAKHNENKO, A. G.

PA 237T13

USSR/Electricity - Induction Motors
Speed Regulation

Jun 52

"Automatic Speed Regulation of Three-Phase Squirrel-Cage Induction Motors," A.G. Ivakhnenko, Cand Tech Sci, Inst of Elec Eng, Acad Sci Ukr SSR

"Elektrichestvo" No 6, 30-36

Cites elements of procedure for calcn of data on exptl model of magnetic drive (using saturable reactor). Examines reversing circuits. Advantages of magnetic drive are: no tubes, contacts, or moving parts; low inertia in changing speeds; simplicity and reliability. It is particularly effective for use with the "arc-stator" motor. Submitted 4 Feb 52.

237T13

IVAKHNENKO, A.G.

Investigating the quality of processes in stable stabilizing systems of control by the feedback method. Sbor.trud.Inst.elektrotekh.AN URSR no.8:79-118 '52. (MLRA 10:2)

(Automatic control)

IVAKHNENKO, A. G.

PA 240T22

USSR/Electricity - Automatic Control Dec 52
Servomechanisms

"Methods of Eliminating the Constant Component of Error in Automatic Control Systems," A. G. Ivakhnenko

"DAN SSSR" Vol 87, No 6, pp 949-953

States that methods of integral control cause a considerable reduction of system stability, which is their basic defect. Shows that the const error component can be reduced to zero without perceptible change in system stability in the method of compound control, i.e., where the system reacts to a disturbance or to time derivatives and integrals of the disturbance. Examples dealt with follow-up and programming systems. Submitted by Acad V. S. Kulebakin 11 Apr 52.

240T22

Elec. Eng. Abst. Vol. 27, No. 676 - Apr. 54

240T22

IVAKHNENKO, A.G. and KRYZHANOVSKIY, OM.

"The Necessity for Scientists and Engineers to Know the Theory of Random Functions," Report submitted at Second All-Union Confernece on Automatic Control Theory, Moscow, 1953

Sum 1467

IVAKHNENKO, A. G.

Ivakhnenko, A. G., "Automatic Control of the Speed of Low-powered Asynchronous Motors," Kiev, Academy of Sciences, Ukrainian SSR, 1953, 228 pages with illustrations; bibliography, Pages 224-226 (70 items). (Institute of Electrical Engineering, Academy of Sciences Ukrainian SSR.)

IVAKHNENKO, A. G.

Ivakhnenko, A. G., "Certain Instances of Designing Self-opening Coupling and Locking Filters for Regulation Systems with Constant Motor Speed," Sbornik traktatov Instituta elektrotekhnika Akademii Nauk Ukrainskogo SSR, No. 10, Pages 39-52, 1953, 2 figures; bibliography, 8 items.

IVAKHNENKO, A.G.

"New Method for Calculating Magnetic Amplifiers," Reported at the Second All-Union Conference on Automatic Control Theory, Moscow, 1953

Sum 1467

IVAKHNENKO, A.G.

"The Conditions of Invariance, which he had Proven Previously, are Applicable to Statistically Specified Perturbations," Report submitted at Second All-Union Conference on Automatic Control Theory, Moscow, 1953

Sum in 1467

IVAKHENKO, A. G.

Ivakhenko, A. G., "Discussion of A. G. Ivakhenko's Article, 'The Theory of Compounding Regulators'," Sbornik Traktatov Instituta elektrotekhnika Akademii Nauk Ukrainskogo SSR /Collected Transactions of the Institute of Electric Engineering Academy of Sciences Ukrainian SSR, 1953, No 10, Pages 116-132. *

* p. 5-38, 1953; 10 figures, bibliography, 13 items.

IVAKHNENKO, A. G.

PHASE X TREASURE ISLAND BIBLIOGRAPHICAL REPORT AID 734 - X

BOOK Call No.: AF653912

Author: A. G. IVAKHNENKO
Full Title: ELECTRIC AUTOMATIC CONTROL: BASIC THEORY OF ELECTRIC CONTROL SYSTEMS. PART I
Transliterated Title: Elektroavtomatika: elementy teorii elektricheskikh sistem regulirovaniya. Chast' I

PUBLISHING DATA
Originating Agency: None
Publishing House: State Publishing House of Technical Literature of the Ukrainian SSR, Kiyev
Date: 1954 No. pp.: 290 No. of copies: 17,000
Editorial Staff: Editor: K. V. Chertoryzhskiy
Managing Editor: T. I. Chumachenko
Technical Editor: M. Vuyek

PURPOSE AND EVALUATION: The book is written for wide circles of engineers and for advanced university students. A three year preparation in electrical engineering institutes is required for the basic chapters of the book. It is also assumed that the reader is familiar with the basic elements of automatic control systems and, in particular, with electron tubes, thyratrons, magnetic amplifiers, amplidynes and electric motors in general. Certain chapters require some basic knowledge of

1/3

. Elektroavtomatika: elementy teorii elektricheskikh sistem regulirovaniya. Chast' I AID 734 - X

linear differential equations. In comparison with the numerous American textbooks on this subject, Ivakhnenko's book omits the more complicated and advanced mathematical theories. For example, there is no analysis of Fourier or Laplace transform, which is present in more or less detailed form in all American books in this field. The author limits himself to the basic differential equations representing the performance of the control systems and their components. In introducing the methods of determining the system stability, as well as almost all other theories connected with control systems, the author emphasizes the role, and usually the primacy of Russian and Soviet scientists, in developing these theories and methods. The book is well illustrated, and has a list of 84 references of which only 4 are non-Russian.

TEXT DATA

Coverage: The book introduces the readers into the elements of automatic control systems, equations of dynamics and statics of control systems, problems of stability, steady-state conditions, and transient performance. The author applies in some instances "inverse" methods of investigation and step-by-step analysis of the equations of dynamics. The author studies the various

2/3

Elektroavtomatika: elementy teorii elektricheskikh sistem regulirovaniya. Chast' I AID 734 - X

control systems according to differences originating in the problems of their regulation. The book is based on the courses on the theory of automatic control which the author taught between 1947 and 1953 at the Kiyev Polytechnical Institute.

Table of Contents

3/22

IVAKHNENKO, A.G.

PHASE X TREASURE ISLAND BIBLIOGRAPHICAL REPORT AID 735- X

BOOK Call No.: AF666810

Author: A. G. IVAKHNENKO

Full Title: ELECTRIC AUTOMATIC CONTROL; INVERSE METHODS OF INVESTIGATING COMPOSITE SYSTEMS OF AUTOMATIC CONTROL. PART II

Transliterated Title: Elektroavtomatika; obratnyye metody issledovaiya kombinirovannykh sistem avtomaticheskogo regulirovaniya. Chast' II

PUBLISHING DATA

Originating Agency: None

Publishing House: State Publishing House of Technical Literature of the Ukrainian SSR

Date: 1954 No. pp.: 218 No. of copies: 17,000

Editorial Staff: Editor: K. V. Chertoryzhskiy
Managing Editor: T. I. Chumachenko
Technical Editor: M. Vuyek

PURPOSE AND EVALUATION: Part II of the book is devoted to the needs of the practicing control system designer and the advanced graduate student. This part goes into more theoretical considerations than the first one, and can be compared with the closing chapters of many American books on this subject (Brown and Campbell, Chestnut and Mayer, Ahrendt and Taplin and others).

1/7
2

Elektroavtomatika; obratnyye metody issledovaiya kombinirovannykh sistem avtomaticheskogo regulirovaniya, Chast' II AID 735 - X

TEXT DATA

Coverage: This second part of the book "Elektroavtomatika" is devoted entirely to the problems of increasing the accuracy and speed of action of composite systems of automatic control. In most instances the author uses synthesis as the method of investigation. He calls this method "inverse" when the solutions or at least some of the properties of the dynamic equations of the system are given, and the general form of the equation or the values of its coefficients have to be determined. The book concerns itself with the theory and design of more complex systems than those ones presented in the first part. It deals, in particular, with linear and nonlinear composite automatic control systems, and with the methods of reducing errors of the steady- and transient states.

Table of Contents

2/

IVAKHNENKO, A.G.; KUKHTENKO, A.I.; KHRAMOY, A.V.; CHILNAYEV, P.I.

Creative cooperation of Russian and Ukrainian scientists in the theory and design of automatic control systems. Avtom. i telem. 15 no.4:289-297 Jl-Ag '54. (MLRA 7:11)
(Automatic control) (Servomechanisms) (Remote control)

Abs.- W-31148, 7 Feb. 55

IVAKHNENKO, A.G.; PARRA, I.K.

Selection of short-circuited rotors and the simplification of magnetic-drive circuits with asynchronous motors. Avtomatyka no.1:69-83 '55. (MLRA 9:10)

1. Institut elektrotekhniki Akademii nauk URSR.
(Electric motors, Induction)

"Four Forms of Invariance Conditions," by O. G. Ivakhnenko, Dopovidi AN URSR, 1955, No 4, pp 323-327 (From Referativnyy Zhurnal--Elektrotekhnika, No 2, Feb 57, Abstract No 3777)

The invariance conditions of the control system require a selection of the diagram and parameter ratios of the system at which the equivalent initial conditions are equal to zero at various perturbations. Three known formulas are analyzed and a fourth is suggested. (U)

Sum IN 1467

IVAKHNENKO, A. G. (Dr. Tech. Sci.); GUBANOV, M. N. (Cand Tech. Sci); BORISOV (Cand. Tech Sci.)

"Choke control."

paper read at the Session of the Acad. Sci. USSR, on Scientific Problems of Automatic Production, 15-20 October 1956.
Automatika i telemekhanika, No. 2, p. 182-192, 1957.

IVAKHNENKO, O.G.

Using conditions of invariability in weakly non-linear systems of automatic control. Dop.AN URSR no.1:20-24 '56. (MIRA 9:7)

1.Institut elektrotekhniki AN URSR. Predstaviv diysniy chlen AN URSR. O.Yu.Ishlinskiy.
(Automatic control)

IVAKHNENKO, A.G.; PARRA, I.K.

Controlling asynchronous motors by rotor premagnetization. Avtomatyka no.1:52-68 '56. (MIRA 9:10)

1.Institut elektrotekhniki Akademii nauk URSR.
(Automatic control) (Electric motors, Induction)

IVAKHNENKO, O.G.; PARRA, I.K.; SHUKAYLO, Ye.M.

Industrial testing of magnetic drives with alternating-current motors. Avtomatyka no.2:44-50 '56. (MLRA 9:10)

1.Institut elektrotekhniki Akademii nauk URSR.
(Servomechanisms) (Electric motors, Alternating current)

IVAKHNENKO, A.G.

Laboratory practice. Avtomatyka no.2:82-90 '56. (MLRA 9:10)

1.Institut elektrotekhniki Akademii nauk URSR.
(Automatic control)

IVAKHNENKO, A.G.

Tasks of optimalizing control systems. Avtomatyka no.3:14-27 '56.
(MLRA 9:11)

1. Institut elektrotekhniki Akademii nauk URSR.
(Automatic control)

IVAKHNENKO, O.G.

Basic trends in development of the automatic control. Avtomatyka no.3: 105-111 '56. (MLRA 9:11)
(Automatic control)

IVAKHNENKO, A.G., doktor tekhnicheskikh nauk.

A useful book on the theory of automatic control. ("Principles of automatic control." V.V. Solodovnikov. Reviewed by A.G. Ivakhnenko). Priborostroenie no.5:29-32 My '56. (MLRA 9:8)

1. Zaveduyushchiy laboratoriyey avtomaticheskogo regulirovaniya Instituta elektrotekhniki AN USSR.
(Automatic control) (Solodovnikov, V.V.)

IVAKHNENKO, A.G.; PARRA, I.K.; SHUKAYLO, Ye.M.

Development of a reversing drive for the cable drum of an electric tractor. Sbor.trud.Inst.elektrotekh. AN URSR no.14:75-92 '56.
(Electric driving) (Magnetic amplifiers) (MLRA 9:12)
(Tractors)

Ivakhnenko, A. G.

Call Nr: TJ213.I84

AUTHOR: Ivakhnenko, A. G.

TITLE: Self-adjustable Systems of Automatic Control (Samonastraivayushchiyesya sistemy avtomaticheskogo regulirovaniya)

PUBLICATION DATA: Izdatel'stvo Akademii nauk Ukrainskoy SSR, Kiyev, 1957, 52 pp., 3,000 copies

ORIGINATING AGENCY: Akademiya nauk Ukrainskoy SSR, Institut Elektrotekhniki

EDITOR: Zil'ban, M. S., Tech. Ed.: Rakhlina, N. P.

PURPOSE: The monograph is intended for engineers, technicians, and other persons working in the field of automatic control.

COVERAGE: The monograph presents the results of development of two new relay types of optimalizing control systems. Similar systems were developed abroad and in the Soviet Union, in particular by A. I. Dryakhlov, E. A. Abov, V. V. Kozakevich, and D. I. Mar'yanovskiy. The theory of nonlinear automatic control systems was developed in the USSR by Ya. Z. Tsypkin, L. S. Gol'dfarb, Ye. P. Popov, A. I. Lur'ye, V. A. Ryabov and

Card 1/4

Call Nr: TJ213.I84

Self-adjustable Systems of Automatic Control (Cont.)

others (pp. 3, 15). A theoretical analysis of composite systems applicable to the study of optimalizing control was made by the Academician V. S. Kulebakin, B. N. Petrov, V. V. Petrov, G. M. Ulanov and A. G. Ivakhnenko (pp. 3, 4). The author describes the various types of optimalizing control systems and illustrates them with examples of controlled machinery and setups. The following were developed by Soviet specialists: Regulator of the rotation angle of waterwheel blades, an automatic device developed by V. A. Bogomolov, Candidate of Technical Sciences, and V. L. Benin at the Khar'kov Laboratory of the Institute of Electrical Engineering of the Ukrainian Academy of Sciences (pp. 8-10); automatic operator for hydroelectric power stations, developed in 1947 by V. A. Bogomolov at the Khar'kov Laboratory of the Institute of Electrical Engineering of the Ukrainian Academy of Sciences; another version of this operator was developed by M. D. Kuchkin, Engineer, and Yu. I. Popov (pp. 10-11). N. Ye. Zhukovskiy determined the optimalizing characteristics for aircraft and obtained a proof of the existence of an optimum in the range of flight (pp. 16-19). An output sampling controller was developed at the Laboratory of Automatic Control of the

Card 2/4

Self-adjustable Systems of Automatic Control (Cont.) Call Nr: TJ213.I84

Institute of Electrical Engineering of the Ukrainian Academy of Sciences (pp. 20-22) and examples of optimalizing control of this type are described: a device for measuring the efficiency of a steam boiler developed at the Kiyevenergo System by Yu. M. Bulavitskiy and G. A. Maralin and also at the L'vov Polytechnical Institute (p. 25). The relay systems presented by the author are based on regulation along the derivative from the actuating input (applying a rate generator) and on the use of memory devices. There are 23 references, 17 of which are USSR, 5 English and 1 translation.

TABLE OF CONTENTS

Card 3/4

Call Nr: TJ213.I84

Self-adjustable Systems of Automatic Control (Cont.)

AVAILABLE: Library of Congress

Card 4/4

IVAKHNENKO, A.G.

Call Nr: AF 1138801

AUTHOR: Ivakhnenko, A.G.

TITLE: Electric Automation; Elements of the Theory of Electric Control Systems (Elektroavtomatika; elementy teorii elektricheskikh sistem regulirovaniya)

PUB. DATA: Gosudarstvennoye izdatel'stvo tekhnicheskoy literatury USSR, Kiyev, 1957, 350 pp., 7,800 copies

ORIG. AGENCY: None given

EDITOR: Chumachenko, T.; Tech. Ed.: Novik, A.; Revisers: Pavlenko, V. and Chaban, O.

PURPOSE: This book is concerned with the more important theoretical problems of automatic control and is addressed to a wide circle of engineering and technical workers, and to students following courses in the higher electrical engineering institutes.

COVERAGE: The book devotes special attention to the problems of "compromise balancing" which is considered the basic problem in static control systems.

~~Card 1/19~~

Call Nr: AF 1138801

Electric Automation; Elements of the Theory of Electric Control Systems

The author also devotes special attention to composite automatic control systems in which the control device is actuated either by changes in the controlled magnitude or directly by changes of the basic load and of its time derivatives. In the introduction, the names of authors of basic text books and monographs on the subject are given, namely: Voronov, A.A., Fateyev, A.V., Yegorov, K.V., Fel'dbaum, A.A., Meyerov, V.M., and others (p. 4). Academician Kulebakin, V.S., is mentioned (pp. 4, 290-293) as the one who demonstrated that disturbance actuated systems are those in which the so called "invariance conditions" of the magnitude to be controlled can be created, in which case the error equals zero. Gol'dfarb, L.S., (pp. 6, 406), Tsypkin, Ya.Z. and Popov, Ye.P. (p. 6), made important contributions to the method of harmonic balance; Tsypkin worked on the elements of the theory of discontinuous control and Solodovnikov, V.V., on statistical methods of allocating disturbances. In the text some research institutes and several names of Soviet scientists and their contributions to the theory and technique of automatic control are given. These include: Tsypkin, Ya.Z., (pp. 23, 163), pulse technique; Ostrogo, P. P. (pp. 24-26), frequency regulator; Chikolev, V.N. (pp. 31, 351 - 352, 359-360, 409), systems with disturbance effect and controlled effect; Ivakhnenko, A.G.(p.31),

Card ~~6/19~~

Call Nr: AF 1138801

Electric Automation; Elements of the Theory of Electric Control Systems

of Meyerov, M.V. (pp. 311, 315, 318) and Turichin, A.M. (p.365) are discussed. The following institutes are enumerated as working on the development of relaxation feedbacks: Institute of Electrical Engineering of the Academy of Sciences of the Ukrainian SSR, All-Union Heat Engineering Institute, Institute of Automation of the Academy of Sciences, USSR, Moscow Power Engineering Institute, and the Central Laboratory of Automation of the Trust "Energoremont" (p. 389); VTI (the All-Union Heat Engineering Institute) developed an electronic regulator of the ЭР-III type (pp. 403-406,407-409, 410); Institute of Electrical Engineering of the Academy of Sciences, Ukrainian SSR worked on the optimalizing control system of the self-oscillating type (pp. 424-429) and on the optimalizing control system of the output sampling type (pp. 431-433); Bulavitskiy, Yu.M. and Maralin, G.A. (p. 436) developed a regulator of the efficiency of steam boilers; the theory of optimalizing control was discussed in several works of Tsypkin, Ya. Z., Gol'dfarb, L.S., Popov, Ye.P. and Ryabov, Ye.A., (p. 437).

There is a bibliography of 43 entries, 31 of which are USSR (one in Ukrainian, the rest in Russian), 2 German, and 10 English. There is a footnote on p. 440 to the effect that the most complete bibliography on automatic control, that compiled by A.V. Khramym, can be found in volume III of the transactions of the All-Union Conference on Problems of Automation, 1953.

Card 4/19

IVAKHNENKO, Aleksey Grigor'yevich; CHUMACHENKO, T., redaktor; NOVIK, A., tekhnicheskiy redaktor

[Electric automatic control; elements of the theory of electric systems of control] Elektroavtomatika; elementy teorii elektricheskikh sistem regulirovaniia. Kiev, Gos.izd-vo tekhn.lit-ry USSR, 1957. 449 p. (MLRA 10:8)
(Automatic control)

SOV/124-58-4-3730

Translation from: Referativnyy zhurnal, Mekhanika, 1958, Nr 4, p 10 (USSR)

AUTHOR: Ivakhnenko, A. G.

TITLE: Automatic Control Systems With Elements of Logical Action (Sistemy avtomaticheskogo regulirovaniya s elementami logicheskogo deystviya)

PERIODICAL: Sessiya AN SSSR po nauchn. probl. automatiz. proiz-va, 1956. Vol 2. Moscow, AN SSSR, 1957, pp 210-230, diskus. pp 231-232

ABSTRACT: The article considers several types of extremal systems of automatic control wherein the tuning of the control unit changes in accordance with a pre-set optimization criterium while the external conditions change. The author calls this criterium "the index of the extremal conditions". In all the examples considered relays are used as the logical elements of the control-unit re-adjustment systems.

1. Control systems--Design 2. Electric relays--Applications

Card 1/1

M. Gaaze-Rapoport

IVAKHNENKO, A.G.; PETINA, N.V.

New methods for calculating the parameters of an automatic control system containing magnetic amplifiers. Avtomatyka no.1: 45-61 '57. (MLRA 10:5)

1. Institut elektrotekhniki AN URSR.
(Automatic control)

IVAKHNENKO, A.G.; SHUKAYLO, Ye.M.

A method for calculating the parameters of a.c. differentiators with phase multiplication [with summaries in Russian and English]. Avtomatyka no.2:35-48 '57. (MLRA 10:8)

1. Institut elektrotekhniki Akademii nauk URSR.
(Automatic control)

IVAKHNENKO, O.G.

Equation of invariance for linear control systems under random disturbances [with summaries in Russian and English]. Avtomatyka no.3:32-38 '57. (MIRA 10:10)

1. Institut elektrotekhniki Akademii nauk URSR.
(Automatic control)

IVAKHNENKO, O.G.

Logical elements for simple cybernetic relay systems [with summary in English]. Avtomatyka no.4:36-51 '57. (MIRA 11:1)

1. Institut elektrotekhniki AN URSR.
(Automatic control) (Cybernetics)

8(2)

PHASE I BOOK EXPLOITATION SOV/1395

Ivakhnenko, Aleksey Grigor'yevich and Nina Vladimirovna Petina

Stabilizatory napryazheniya s kombinirovannym upravleniyem (Voltage Regulators With Complex Control) Kiyev, Izd-vo AN Ukrainskoy SSR, 1958. 243 p. 3,000 copies printed.

Sponsoring Agency: Akademiya nauk Ukrainskoy SSR. Institut elektrotekhniki.

Resp. Ed.: Chumakov, N.M., Candidate of Technical Sciences; Ed. of Publishing House: Kazantsev, B.A.; Tech. Ed.: Sivachenko, Ye.K.

PURPOSE: The book is intended for scientists, engineers and technicians, in particular for specialists in automatic regulation and those concerned with the applications of magnetic amplifiers.

COVERAGE: The book briefly describes the theory of automatic regulation in complex(multi-loop) systems (regulation being triggered not only by deviation of the controlled variable from its nominal value, but also by the primary disturbance and its derivatives).

Card 1/7

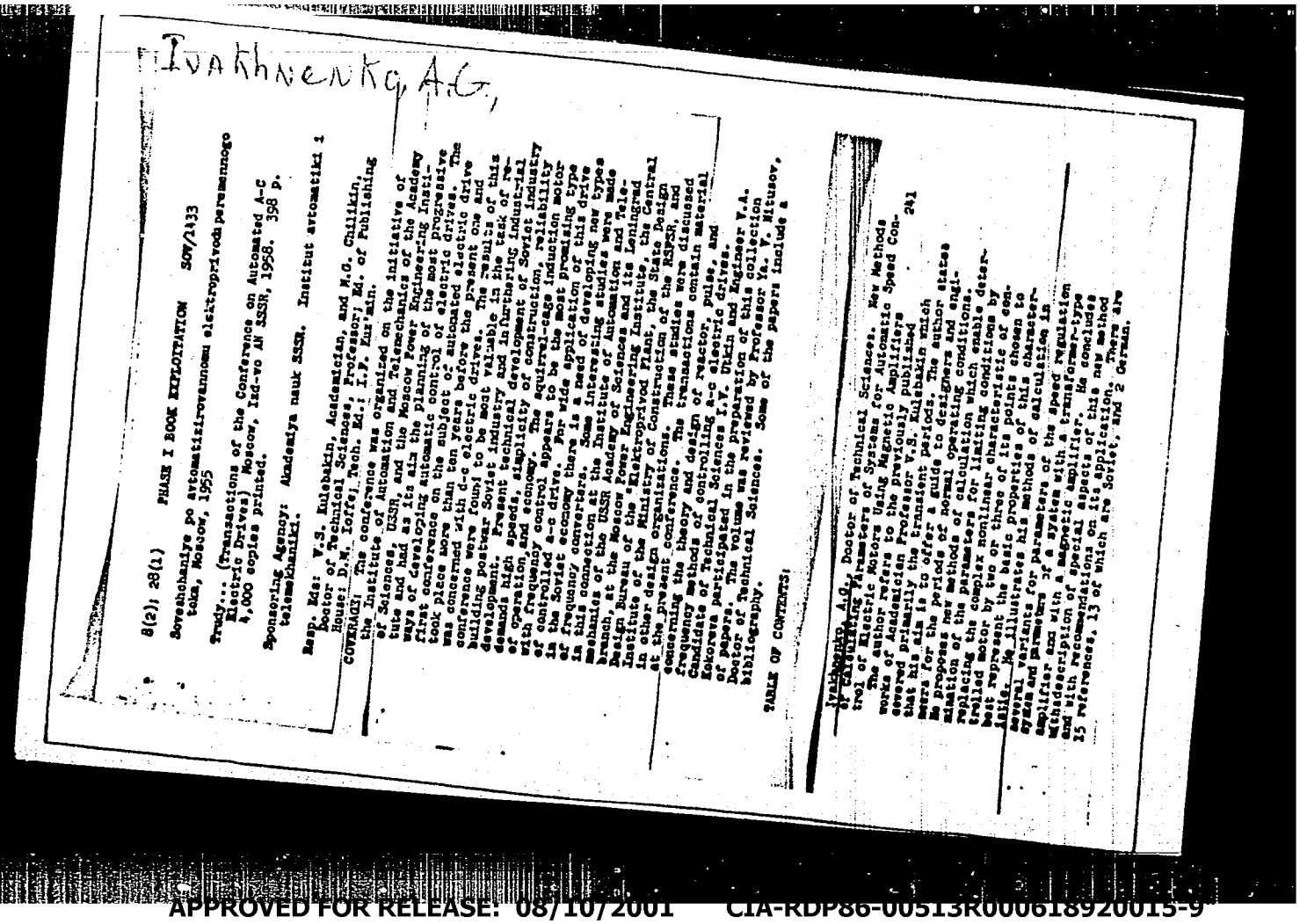
Voltage Regulators With Complex Control SOV/1395

The investigation of transient operating conditions made earlier by A.G. Ivakhnenko (taking into account nonlinearities of the amplifier) permitted the general conclusion that in complex systems activated by disturbances and their derivatives, the transient and steady-state errors may be entirely eliminated if the system accelerations do not exceed a certain value. Another prerequisite for the complete elimination of error consists in the recurrence of the same form of the transient. The system should be such that the same disturbance under the same initial conditions will always produce the same transient with respect to shape and amplitude. Otherwise, regulation with inputs consisting of disturbance functions and their derivatives will in one process diminish the error and in another increase it or even change its sign. Basic theoretical notions on steady-state conditions of complex systems were employed in the calculation of magnetic amplifier parameters. The authors describe various types of voltage regulators currently used by consumers of electric power. The advantages of complex automatic control systems are presented in the works of Academician V.S. Kulebakin, B.N. Petrov, G.M. Ulanov, and other specialists. Two books by A.G. Ivakhnenko are devoted to this subject. The present book covers the problems of practical application of these systems to a-c voltage regulation for maintaining a stabilized voltage at the point of delivery. According to N.M. Chu-akov, editor of the book, the authors obtained new results both in the theory of complex systems as well as in the

Card 2/7

development and practical application of new types of voltage regulators. There are 68 references, of which 63 are Soviet and 5 English.

TABLE OF CONTENTS:



Ivakhnenko, A.G.

8(2); 28(1) PHASE I BOOK EXPLOITATION SOV/1433

Sovershchaniye po avtomatizirovannomu elektroprivodu peremennogo toka, Moskva, 1955

Trudy... (Transactions of the Conference on Automated A-c Electric Drives) Moscow, Izd-vo AN SSSR, 1958. 398 p. 4,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut avtomatiki i telemekhaniki.

Resp. Eds: V.S. Kulebakin, Academician, and M.G. Chilikin, Doctor of Technical Sciences, Professor; Ed. of Publishing House: D.M. Ioffe; Tech. Ed.: I.P. Kuz'min.

COVERAGE: The conference was organized on the initiative of the Institute of Automation and Telemechanics of the Academy of Sciences, USSR, and the Moscow Power Engineering Institute and had as its aim the planning of the Academy ways of developing automatic control of the most progressive first conference on the subject of automated electric drives. took place more than ten years before the present one and was concerned with d-c electric drive. The conference were found to be most valuable in the task of re- building postwar Soviet industry and in furthering industrial development. Present technical development of Soviet industry demand high speeds, simplicity of construction, reliability of operation and economy. The squirrel-cage induction motor with frequency control appears to be the most promising type of controlled a-c drive. For wide application of this drive in the Soviet economy there is a need of developing new types of frequency converters. Some interesting studies were made in this connection at the Institute of Automation and Tele- mechanics of the USSR Academy of Sciences and the Leningrad Design Bureau of the Moscow Power Engineering Institute and its Leningrad Institute of the Ministry of Electrotechnical Plant, the Central in other design organizations, the State Design Institute at the present conference. These studies were discussed concerning the theory and design of reactor, pulse, and frequency methods of controlling a-c electric drives. Candidate of Technical Sciences I.V. Ukin and Engineer V.A. Kokorevs participated in the preparation of this collection of papers. The volume was reviewed by Professor Ya. V. Mitusov, Doctor of Technical Sciences. Some of the papers include a bibliography.

TABLE OF CONTENTS:

AUTHOR: Ivakhnenko, A.G.

TITLE: Elements of the General Theory of Combined Cybernetic Systems (Elementy zagal'noi teorii kombinovanykh kibernetychnykh system) 102-58-1-2/12

PERIODICAL: Avtomatika (Kiyev), 1958, Nr 1, pp 20 - 36 (Ukrainian SSR).

ABSTRACT: The block diagrams of greatly differing cybernetic systems (e.g. self-adjusting, programmed, servo, non-linear, or with varying responses or structures) are shown to be related; the general theory is developed on this basis. All such systems are shown to be based on one of two operating principles, namely, feedback or deliberate (forced) search for some optimum condition. In cybernetic systems, the feedback system exists in a state of continuous oscillation essential to the search for the optimum condition; logical elements are frequently incorporated. The best systems combine both methods. All the techniques of general automatic control theory are shown to be applicable to extremal systems (i.e. ones which seek an extreme value of some quantity, by whatever method) and hence to all cybernetic systems (though this is not demonstrated for every particular theorem in control theory). The argument is illustrated by reference to various types of equipment (maintained-temperature furnaces, electronic

Card1/2

Elements of the General Theory of Combined Cybernetic Systems 102-58-1-2/12

amplifiers, generator voltage stabilisers operating via the exciters). The discussion is general and non-mathematical; the optimal characteristics of combined systems which give fixed steady-state modes in response to varying conditions are derived. Analogies are drawn between the methods of studying the steady-state conditions in combined astatic stabilisation systems and those for optimalizing systems. The effects on the steady-state and dynamic follow-up errors of derivative and error feedback are briefly considered. The conditions under which the transient response can be invariant in an extremal system are then considered. The general natures of the errors in cybernetic systems are as for other simpler, automatic control systems; apart from the essential (small) search error, it is possible to reduce the steady-state and transient errors by including logical elements. There are 9 figs. There are 7 Soviet references.

ASSOCIATION: Instytut elektrotekhniky AN URSR (Institute of Electrical Engineering, Ac.Sc. Ukrainian SSR)

SUBMITTED: September 18, 1957

Card 2/2

AUTHOR: A. G. Ivakhnenko

TITLE: Self-adjusting Cybernetic Systems (Kibernetychni systemy z samonalashtuvannyam ustavkoyu (nastroykoyu)

SOV/102-58-2-4/10

PERIODICAL: Avtomatyka, 1958. No.2. (USSR) pp. 30-47

ABSTRACT: This paper is one in a series concerned with cybernetic automatic control systems; extremum (peak-holding) control is the subject of this one. Only systems with single-valued characteristics (which may depend on several variables, though most of the discussion relates to one only) are considered. 'Self-adjusting' and 'peak-holding' are used as equivalent in this article, though this is, of course, not universally so. Fig.2. shows the type of characteristic envisaged; the peak-holding regulator keeps the system at the point 0, and is only required if the optimum condition in the system corresponds to varying values of one parameter when another parameter varies. After this general discussion, which terminates with a classification of extremal systems (Fig.3) with peaks in one parameter only, an example of a three-zone metallurgical furnace (for heating billets for rolling) is considered. Fig.4. relates to three possible ways of controlling a water supply pump. Fig.5. relates to a glaxing furnace in which the air supply is adjusted to the fuel supply by successively testing the various settings; Fig.6. a system for the same purpose in which a perturbation is periodically applied to the temperature detector.

Card 1/2

Self-adjusting Cybernetic Systems, SOV/102-58-2-4/10

Fig.7. relates to the problems which extremal regulators which would be based on differentiation may involve; in a) no derivative exists, in b) a stabilizing and not an extremal system is required, and only c) can be extremal (i.e. have a derivative which changes sign). Examples of stepping (discrete-action) extremal systems (models of) are considered in Figs. 8. & 9. (with or without tachometers respectively). Fig.10. deals with systems in which an input modulation and a phase discriminator are used to detect the extremum. Other systems are more briefly reviewed. Combined systems (i.e. ones where both error and velocity feedback are used are then considered, including ones with nonlinear feedbacks not involving oscillation, and certain others of lesser interest. The paper contains 12 figures and 6 references, all Soviet.

ASSOCIATION: Instytut elektrotekhniky AN URSR (Institute of Electrical Engineering Ac.Sc. Ukrainian SSR)

SUBMITTED: February 19, 1958.

1. Cybernetics--Applications 2. Control systems--Design

Card 2/2

IVAKHNENKO, A.G.

SOV/102-58-3-1/10

AUTHOR: Ivakhnenko, O.H. (Ivakhnenko, A.G.)

TITLE: Basic Problems of the General Theory of Cybernetic Automatic Control Systems. Part I. (Osnovni pytannya zagal'noi teorii kibernetychnykh system avtomatychnogo upravlinnya. Chastyna 1).

PERIODICAL: Avtomatika (Kyiv), 1958, Nr.3, pp.1-22. (USSR)

ABSTRACT: This paper was presented at the Conference on Automation of the Warsaw Polytechnic Institute on the occasion of the Fortieth Anniversary of the October Revolution.
All control systems which have functions beyond those of simple stabilizers, program controllers and servo controls are termed cybernetic. This first article deals briefly with the classification of cybernetic systems into three main types and 10 subtypes. An example of this classification in terms of the theoretical circuit is considered (a servo in which the gain is varied as a function of the spectral density of the signal in the absence of noise: a topic to be dealt with in detail in a later article). The input to the system is that shown in Fig.1a; the spectral

Card 1/4

Basic Problems of the General Theory of Cybernetic Automatic Control Systems. Part I.

density and autocorrelation function are given in the second display equation. The particular system considered is seen in the rest of the figure; the lower sets of curves relate the error to frequency and amplitude. The forced component in the output resulting from a step input (assuming symmetrical amplification) is given at the foot of p.3 (Fourier series, odd harmonics). The root-mean square free and forced errors are then given in standard form. A particular example is then considered; the conditions for the locus of minimum error are given at the foot of p.5; it is shown that the gain of a cybernetic system can exceed that specified by the stability conditions. Figs.2 and 3 show examples of such systems. The simplicity of error-actuated systems is pointed out. The next section deals with the astatic and static characteristics of a combined extremal system. Fig.4 compares stabilizing and extremal systems; analogies are drawn. Table 1 lists the control laws, regulator and controlled object, and static equations for the two types of system; and Table 2 the

Basic Problems of the General Theory of Cybernetic Automatic Control Systems. Part I.

equations for the static characteristics. The various effects to be expected from altering the feedback to the regulator amplifier and other parameters, as in correcting servos, are listed. The following sections deal with feedback (linear and otherwise), error components and dynamic equations for systems with one or more inputs, with particular attention to extremal systems of self-oscillating type (e.g. as in the structural diagram of Fig.5). The equations for this system of Fig.5 are given in Table 3. Systems using hunting are briefly considered (pp.14-15), followed by those using a search signal (general structure as of Fig.7). Various methods of improving the accuracy of extremal systems are considered in the next two sections; the conditions for the methods to be independent ('orthogonal') are then briefly considered. There are 8 figures, 3 tables and 13 references, of which 11 are Soviet, 1 German and 1 English.

SOV/102-58-3-1/10

Basic Problems of the General Theory of Cybernetic Automatic Control Systems. Part I.

ASSOCIATION: Instytut elektrotekhniky AN URSR (Institute of Electrical Engineering, Academy of Sciences, Ukr.SSR.)

SUBMITTED: March 17, 1958.

Card 4/4

SOV/102-58-4-1/11

AUTHOR: Ivakhnenko, A O.G.

TITLE: Fundamental Problems in the General Theory of Cybernetic Automatic Control Systems (Part 2)

PERIODICAL: Avtomatika, 1958, Nr 4, pp 1-18 (UkrSSR)

ABSTRACT: This part extends the treatment of the first part to systems in which noise is present at the input as well as the useful signal. Information theory methods are used to consider how the stability against noise can be improved by altering the feedback loops in systems working with weak signals. The classification of systems detailed in the previous part is used, with cybernetic extremal systems. The methods of improvement dealt with are 1) filtration, 2) deriving the autocorrelation function, 3) deriving the mutual correlation function, 4) integration (storage), 5) phase-sensitive methods. The first is dealt with very briefly; Fig 2 illustrates one method used with a device that searches for the brightest part of the horizon. The second (auto-correlation) is considered in relation to a radio receiver of input given by the first equation; the remarks are only general. The temperature regulator of a furnace dealt with in the first paper is now considered, but with

Card 1/3

Fundamental Problems in the General Theory of Cybernetic Automatic Control Systems (Part 2)

an autocorrelation system; linear and relay amplifiers are dealt with cursorily. The third (mutual correlation) is now considered in relation to the same objects as the second (Figs 5 and 6). Detailed study is made of the effects of harmonic noise in such systems (Fig 7), and of the proper choice of modulating frequency from statistical criteria; an example of a servo is dealt with. The methods presented at the Cranfield Conference are used. The fourth (integration) is mostly concerned with integration by finite steps (e.g. with relays); the furnace controlled by a stepping regulator is considered (Fig 9). The phase-sensitive method is dealt with very briefly. The various methods are compared and figures of merit are assigned (filtration = = unity) in the table; the best (digital radar) relates to a system not yet in use. Some apparatus for the mutual correlation method is in production in the USSR.

SOV/102-58-4-1/11

Fundamental Problems in the General Theory of Cybernetic Automatic Control Systems (Part 2)

Card 3/3 There are 10 figures and 8 references, of which 5 are Soviet, 1 is German and 2 are translation from English.

ASSOCIATION: Instytut elektrotekhniky AN URSR
(Electro-technical Institute, Ac.Sc. UkrSSR)

SUBMITTED: August 5, 1958

KHAYMOVICH, Ye.M., otv.red.; GUL'KO, M.M., red.; ZASLAVSKIY, S.Sh., red.; LOPATA, A.Ya., red.; LYCH, N.M., red.; ORLIKOV, M.L., red.; FAYNERMAN, I.D., red.; KHARAGORGIYEV, S.I., red.; V retsenzirovanii i redaktirovanii prinimali uchastiye: GREBEN', I.I.; ZAMANSKIY, S.M.; IVAKHNENKO, A.G.; MEZHNIKOV, V.L.; MOSENKIS, M.G.; FARBER, A.M.; SOROKA, M.S., red.izd-va.

[Mechanization and automation in the machinery industry] Mekhanizatsiia i avtomatizatsiia v mashinostroenii. Moskva, Gos. nauchno-tekhn.izd-vo mashinostroit.lit-ry, 1959. 286 p. (MIRA 12:8)

1. Nauchno-tekhnicheskoye obshchestvo mashinostroitel'noy promyshlennosti. Kiyevskoye oblastnoye pravleniye. (Automation) (Machinery industry)

IVAKHNENKO, Aleksey Grigor'yevich; ZAYTSEV, G., kand.tekhn.nauk, red.; KUROCHKIN, P., vedushchiy red.; MATUSEVICH, S., tekhn.red.

[Technical cybernetics; systems of automatic control with adaptation of characteristics] Tekhnicheskaia kibernetika; sistemy avtomaticheskogo upravleniia s prisposobleniem kharakteristik. Kiev, Gos.izd-vo tekhn.lit-ry USSR, 1959. 421 p. (MIRA 13:1)

(Automatic control)

KHOKHLOV, Aleksey Fedorovich; IVAKHNENKO, A.G., prof., doktor tekhn.nauk, retsenzent; CHUMAKOV, N.M., kand.tekhn.nauk, red.; ALAVERDOV, Ya.G., red.izd-va; SOKOLOVA, T.F., tekhn.red.; MODEL', B.I., tekhn.red.

[Theory and industrial use of automatic control systems] Teoriia i tekhnicheskoe primenenie avtomaticheskikh ustroistv. Moskva, Gos.nauchno-tekhn.izd-vo mashinostr.lit-ry, 1959. 583 p. (MIRA 12:10)

(Automatic control)

IVAKHNENKO, A.G.

PHASE I BOOK EXPLOITATION SOV/4526

Soveshchaniye po teorii invariantnosti i yeye primeneniyu v avtomaticheskikh ustroystvakh. Kiyev, 1958

Teoriya invariantnosti i yeye primeneniye v avtomaticheskikh ustroystvakh; trudy soveshchaniya (Theory of Invariance and Its Applications to Automatic Devices; Transactions of the Conference Oct. 16-20, 1958) Moscow, 1959. 381 p. No. of copies printed not given.

Sponsoring Agency: Akademiya nauk Ukrainskoy SSR. Otdeleniye tekhnicheskikh nauk.

Resp. Ed.: V.S. Kulebakin, Academician; Editorial Commission: V.A. Bodner, Doctor of Technical Sciences, A.G. Ivakhnenko, Doctor of Technical Sciences, A.Yu. Ishlinskiy, Academician, Academy of Sciences UkrSSR, N.A. Kachanova, Candidate of Technical Sciences, P.I. Kuznetsov, Doctor of Physics and Mathematics, A.I. Kukhtenko, Doctor of Technical Sciences, B.N. Petrov, Corresponding Member, Academy of Sciences USSR, Ye.P. Popov, Doctor of Technical Sciences, G.M. Ulanov, Doctor of Technical Sciences, K.K. Khrenov, Academician, Academy of Sciences Ukrainian SSR, P.I. Chinayev, Candidate of Technical Sciences, and N.M. Chumakov, Candidate of Technical Sciences; Tech. Ed.: G.V. Kruglov.

PURPOSE: This collection of papers is intended for engineers and other specialists working in various fields of automation.

COVERAGE: The collection includes reports and papers presented at the Conference on the Theory of Invariance and Its Applications to Automatic Devices, which was called by the Otdeleniye tekhnicheskikh nauk (Department of Technical Sciences) and the Institut elektrotekhniki (Institute of Electrical Engineering) of the Academy of Sciences of the Ukraine and convened in Kiyev October 16 - 20, 1958. The papers presented are concerned with high-quality automatic control systems designed on the basis of compensating for the effects of disturbances or maintaining the invariance of the quality to be regulated with respect to the disturbances acting on the system. The reports treat the physical and mathematical foundations of invariance in automatic control systems; they also consider methods for designing and calculating invariant systems and problems connected with specific cases of practical applications of compensation in various automatic systems. On the basis of these reports it was established by the Conference that, by utilization of the conditions of compensation and the principle of invariance, it is possible to produce automatic systems and various arrangements which are more perfect from the viewpoint of quality of the regulation and control process, stability, simplicity of construction, and reliability of operation. The following members of the Kiyev Seminar on Automatic Control are mentioned as organizers of the conference: A.I. Kukhtenko, A.G. Ivakhnenko, Yu.G. Korneilov, O.M. Kryzhanovskiy, N.M. Chumakov, N.A. Kachanova, and P.I. Chinayev. References accompany each article.

~~Card 4/8~~

8

05360
SOV/102-59-1-4/12

AUTHOR: Ivakhnenko, O.G.

TITLE: The Main Problems of the General Theory of Cybernetic Automatic Control Systems (Part III)

PERIODICAL: Avtomatika, 1959, Nr 1, pp 39-51 (USSR)

ABSTRACT: Reference is made to parts I and II for the general approach; in this part the system is subject to noise and to a pulsed sign-variable signal. Fig 1 shows how the error of a servo may depend on the gain α and on the noise level (for four values of noise level). Fig 2,a shows an open-loop servo in which the unit $K_N(p)$ has the function of reducing the noise error; Fig 2,b shows a servo with feedback (the error is minimized by choosing $Y_2(p)$ suitably); and Fig 2,c shows a system in which the two methods are combined to eliminate noise error and to minimize follow-up error. Fig 3 relates similarly to stabilizers. Fig 4 relates to cybernetic servos and Fig 5 to cybernetic stabilizers; the function of the units KP is to adjust the gain of the various amplifiers in accordance with the noise and error signals in order to minimize the final error (root-mean-square). General rules applicable to the design of such systems

Card 1/2

The Main Problems of the General Theory of Cybernetic Automatic Control Systems (Part III)

are discussed in non-mathematical terms. The second half of the paper (pp 44-51) deals with an approximate method of selecting the best parameters for such systems, with especial reference to the star-follower shown in Fig 6. Fig 7 shows amplitude-phase curves for various values of the damping coefficient c_{12}; the second part of the figure illustrates the graphical method of finding the optimum values. Fig 8 illustrates a system in which the gain is adjusted in accordance with the noise level only; in Fig 9 the gain is also dependent on the brightness as well. The paper concludes with a very brief discussion of other methods of reducing the error. There are 10 figures and 6 references, 5 of which are Soviet and 1 English.

ASSOCIATION: Institut elektrotekhniki AN URSR (Institute of Electrical Engineering, Academy of Sciences UkrSSR)

SUBMITTED: March 3, 1958

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AUTHOR: Yvakhnenko, O.H. 9

TITLE: The Main Problems of the General Theory of Adaptive Automatic Control Systems (Part IV)

PERIODICAL: Avtomatika, 1959, Nr 2, pp 1-18 (UkrSSR)

ABSTRACT: This last part of the set deals with combined (open-loop and closed-loop) extremal systems. The first section of the paper deals with the conditions of invariance for normal and cybernetic automatic systems. The conditions are presented in four forms; these forms are given on p 1 in relation to the system whose equation is given immediately above. Each form is dealt with separately. The first is of no practical value; the second is the strongest, and is discussed at length in relation to real (nonlinear)systems, especially those having two channels so designed that the error caused by one is exactly balanced by the error caused by the order. The conditions of invariance are "orthogonal" to the stability conditions. The third form is expounded in the form presented by the original author who deduced the first three forms (Ref 2). The fourth form is a new one, first deduced by the author of the present paper, and has special application to systems of the type envisaged here. The table (p 6) compares 4

Card 1/2

IVA(K)HNENKO, A.G.

report to be presented at the 1st Intl Congress of the Intl Federation of Automatic Control, 25 Jun-5 Jul 1960, Moscow, USSR.

BYKHOVSKIY, M. L. - "Ultra stability in electronic calculating devices
in the solution of onlinear equations in indefinite form"
CHELYUSTKIN, A. B. - "Use of calculating devices in systems for
the automatic control of rolling mills"
CHICHINADZE, V. K. - "Concerning some problems of the organization of
self-adjusting and self-teaching systems of automatic control,
based on principles of random search"
DAVYDOV, N. I. - "Development of automatic control systems for boiler
units"
DUDNIKOV, Ye. G. - "Determination of optimum adjustments of industrial
automatic regulation systems according to initial data obtained from
experience"
DUB'IN, A. I., and ROZENVASSER, E. N. - "Methods of organizing Lyapunov
functions in the theory of nonlinear regulating systems"
DRUZHININ, N. N. - "Balanced regulation and inter-communications of
a multi-motor electric drive and technology in continuous rolling
mills"
FEL'DBAUM, A. A. - "Problems of statistical theory of automatic
optimization systems"
FEYGIN, Y. L. - "Automation of a reversible cold rolling mill for
nonferrous metals"
FILIPPOV, A. F. - "Application of the theory of differential equations
with a discontinuous right side to nonlinear problems of automatic
regulation"
GAVRILOV, M.A. - "Structural surplus and operational reliability of
relay devices"
GANKIN, M. Z. - "Automation of irrigation systems"
GRUZINENBERG, G. R., KASUTKIYAN, V. R., KOSTENKO, M. P., NEKMAN, L. R.,
and SHKNY, N. S. - "Power regulation of disturbance and problems of
the stability of electric power systems"
GINZBURG, S. A. - "Logical method of synthesis of functional converters"
IL'IN, V. A. - "Methods of transmission of information and the structure
of telemechanical systems for dispersed structures"
IMOBOV, V. L., and LUTSKIY (fnu) - "The code-impulse system of tele-
measurement for dispatched operations of trunk-line gas pipe lines"
IVAKHNENKO, A.G. - "Concerning the application of the theory of combined
regulation systems for cybernetic adaptation systems"
KARANDEYEV, K. B., and SHTAMBERGER, G. A. - "A quasi-equilibrated bridge
as an element in a system of automatic control"
KAZAKEVICH, V. V. - "Concerning the process of extra regulation of inert
objects in the presence of disturbance"
KAZAKOV, I. E. - "Some problems of the theory of statistical linearization
and its application"
KILIN, F. M. - "Some problems of the theory of impulse systems with
time selectors" VOSKRESENSKIY, L.M., IOFFE, D. M.,
KOBRINSKIY, A. E., BOLKHOVITIN, S. V., SLAVUTSKIY, Ya. L., SYSIN, A. Ya., and
POLYAN, E. P., POPOV, B. P.,
YAKOBSON, Ya. S. - "The problem of bioelectric control"
KOLOMIYETS, B.T. - "New types of photo resistances and their field of use"
KOROBKO, M.I., MIKHAYLOV, B. G., and SHUMILOV, K. A. - "System of
automatic control and regulation of blast distribution in the tuyeres
of blast furnace"
KOROBOCHKIN, B. L. - "Investigation of the dynamics of the hydraulic
duct of a copying lathe"
KRASOVSKIY, A. A. - "Dynamics of continuous systems of automatic
regulation with extra self-adjustment of corrective devices"
KRASOVSKIY, N. N. - "Concerning the selection of parameters of
optimum stability systems"
KUKHTENKO, A. I. - "The dynamics of devices imitating living organisms"
KULEBAKIN, V. S. - "The invariant theory of automatic regulation and
control systems"
LANIN, I. D. - "Pneumatic calculating devices as a means of insuring the
reliability of complex automation systems"
LAZAREV, V. [illegible] and PANKROMENKO, P.P. - "Mechanization of processes
of analysis and synthesis of the structure of relay devices"

KALUZHNIKOV, Nikolay Anatol'yevich; IVAKHNENKO, A.G., prof., retsenzent; BENIN, V.L., dotsent, retsenzent; STUPEL', F.A., dotsent, retsenzent; SUKACHEV, A.P., dotsent, otv.red.; DEREVYANCHENKO, R.M., red.; NIKULINA, N.I., tekhred.

[Designing of magnetic amplifiers] Raschet magnitnykh usilitelei. Khar'kov, Izd-vo Khar'kovskogo gos.univ. im. A.M.Gor'kogo, 1960. 352 p. (MIRA 14:4)
(Magnetic amplifiers)

84887

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AUTHOR: Ivakhnenko, O.G. (Kyyiv)

TITLE: Connection Between the Non-Absolute Invariantness Condition and the Structural Synthesis of High Fidelity Systems

PERIODICAL: Avtomatika, 1960, No.1, pp.3-14

TEXT: It is stated that the condition of non-absolute invariantness is practically applicable in rigid systems having "beak-like" frequency response. The questions of the synthesis and optimum design of such systems have been elaborated by G.R. Hertzenberg and M.V. Meyerov as well as by H. Nyquist and E. Peterson, J.G. Kreer and L.A. Ware. These researches have not hitherto been linked with the general theory of invariantness as proposed by G.V. Shchipanov. The aim of the present paper is to supply this want. In a two-circuit system of third order the dimensionless parameter of Vyshnegradskiy can be maintained constant for an increasing frequency $\omega_o \to \infty$: $x = \text{const}$, $y = \text{const}$. Here the coefficients of the characteristic equation increase, that corresponds to the condition of the non-absolute invariantness. For each value of ω_o the author determines the coefficients of the inner return lead $n(p) = n_o + n_1 p + n_2 p^2 + \ldots$ and its amplification coefficient.

Card 1/3

84887

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Connection Between the Non-Absolute Invariantness Condition and the Structural Synthesis of High Fidelity Systems

The larger the amplification the nearer is the system to the absolute invariance. The amplification can be raised until the practical fluctuations of n_0, n_1, n_2 do not influence x and y too much.

The complete cancelling of the error must be performed by the positive inner return lead $n(p) = n_0+n_1p+n_2p^2$ as well as by the compound link $l(p) = l_0+l_1p+l_2p^2$.

According to (Ref.4) the combined systems are regulated so that at first the parameters of the left side of the equation and then the parameters of the right side are chosen.

Beside of the condition of the non-absolute invariantness the author considers an other invariantness condition connected with the theory of dynamic programming. It is stated once more that the most effective methods of control techniques are connected with the general invariantness theory.

Card 2/3

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C111/C222

Connection Between the Non-Absolute Invariantness Condition and the Structural Synthesis of High Fidelity Systems

The author mentions V.S. Kulebakin, V.M. Meyerov, G.V. Shchipanov, P.I. Kuznetsov, M.M. Luzin, G.V. Gertsenberg, V.G. Terskov, S.M. Fedorov, O.I. Kukhtenko, B.M. Petrov and G.M. Ulanov.
There are 3 figures, 1 table and 21 references: 14 Soviet and 7 American.

SUBMITTED: July 24, 1959

Card 3/3

IVAKHNENKO, A.G. [Ivakhnenko, O.H.] (Kiyev)

Brief report on a research mission to the United States of America. (MIRA 14:5)
Avtomatyka no. 1:78-86 '60.
(Automatic control)

IVAKHNENKO, A.G.

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AUTHOR: Ivakhnenko, O.G. (Kyyiv)

TITLE: Correlation Methods for Cybernetic Control Systems

PERIODICAL: Avtomatika, 1960, No.2, pp. 20-37

TEXT: Every problem of stabilization can be solved with the aid of extremal controls. Herefore it is sufficient to insert a rectifier and a filter at the outlet of the transmitter of the control deviation. Here the system is free of interference magnitudes of high frequency, but a hunting appears and the apparatus becomes complicated. For a simplification of the apparatus the ordinary proportional functions can be replaced by relay functions. For sin ωt, sin $k(t)\omega t$ and for rectangle functions with a change of sign the ordinary correlation functions are equal to the relay functions. $\mu(t-\tau)$ or A sign $\mu(t-\tau)$ or every other periodic function having the same intersection prints with the t - axis can be used as the second factor of the integrand of the correlation function. Here that function has to be preferred which guarantees an easier and completer smoothing (filtering) of product. From this point of view, for harmonic signals the relay functions

Card 1/2

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C111/C222

'Correlation Methods for Cybernetic Control Systems

have to be preferred to the proportional functions.. Relay functions as well as proportional functions can be applied for the determination of the scheme and the parameters of a four-pole system without experiments with artificial disturbances and for the determination of the sign of the deviation of the system from the extremum. With respect to disturbances the schemes with relay correlators are less stable than those with proportional correlators. The author gives a method for an improvement of the stability. There are 10 figures and 12 references : 7 Soviet, 2 German, 1 English and 2 American.

SUBMITTED: January 26, 1960

Card 2/2

IVAKHNENKO, A.G. [Ivakhnenko, O.H. (Kiyev)

Brief report about a scientific mission to Great Britain.
Avtomatyka no.3:76-92 '60. (MIRA 13:10)
(Great Britain--Electronics) (Great Britain--Automatic control)

IVAKHNENKO, A.G. [Ivakhnenko, O.H.] (Kiyev)

Brief report about a scientific mission to England. Avtomatyka no.4:81-97 '60. (MIRA 13:11)
(Great Britain—Electronics)

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16.8000

AUTHOR: Ivakhnenko, O. H. (Kiyev)

TITLE: The relation between invariance theory and the stability theory of measurement systems

PERIODICAL: Avtomatyka, no. 5, 1960, 1-12

TEXT: The author states the result of his previous work (Ref. 1: Avtomatyka, no. 1, 1960) that in multi-cycle systems the gain, frequency of oscillations and the unflexibility may theoretically be increased so that the error is reduced practically to zero while the degree of stability remains constant. However, for great values of the frequency, the variations of the coefficients of the feedback amplifiers give an unstable result. It is necessary to find a method of calculating the permissible limits of the feedback coefficients. The author then proceeds to attempt to develop new methods of investigating control systems. It is shown that the methods used in the theory of measuring devices may be applied to this problem. If the system consists of components similar to a.c.

Card 1/2

The relations between ...

amplifiers with zero drift the methods of relative error investigation may be used; if the components resemble d.c. amplifiers (with zero drift) the methods of absolute error investigation are used. The author has not developed a method for the case of a system consisting of both types of components. As an example, the author derives a system of equations for calculating the necessary reliability of the feedback coefficients, n_0, n_1, n_2 in terms of the static error and the Vyshnehrads'kyy dimensionless parameters x and y. The equations are solved several times, the gain being increased each time, until the permissible limits of the coefficients are established. The author concludes that the methods of modern electrical measurement theory may be applied to solve an important problem of the invariance theory. There are 5 figures and 5 references: 4 Soviet-bloc and 1 non-Soviet-bloc.

SUBMITTED: July 29, 1960

Card 2/2

IVAKHNENKO, A. G.

"Inductive and Deductive Methods of Recognition as the Basis for Developing Two Basic Types of Learning Systems."

Report submitted for the Symposium on Principles in the Design of Self-Learning Systems, Kiev Ukr SSR, 5-9 May 1961